

WE CLAIM:

1   xx           1.   A well control and monitoring system for  
2   the control and monitoring of a plurality of wells  
3   comprising:  
4               a remote control center;  
5               a plurality of surface control and monitoring  
6   systems, wherein each of the wells is provided with a  
7   corresponding one of the surface control and monitoring  
8   systems, and wherein the surface control and monitoring  
9   systems are in communication with the remote control  
10   center; and,  
11              a plurality of down hole monitoring and control  
12   systems, wherein each of the wells is provided with at  
13   least one of the down hole monitoring and control  
14   systems, wherein each of the down hole monitoring and  
15   control systems is in communication with at least one of  
16   the surface control and monitoring systems, and wherein  
17   each of the down hole monitoring and control systems  
18   comprises a non-cooled, high temperature controller  
19   arranged to perform monitoring and control functions  
20   within a corresponding one of the wells.

1                   2.     The well control and monitoring system of  
2 claim 1 further comprising at least one sensor coupled to  
3 the controller of at least one of the down hole  
4 monitoring and control systems.

1                   3.     The well control and monitoring system of  
2 claim 2 further comprising a multiplexer coupling the  
3 sensor to the controller of the at least one of the down  
4 hole monitoring and control systems, wherein the  
5 multiplexer comprises a non-cooled, high temperature  
6 multiplexer.

1                   4.     The well control and monitoring system of  
2 claim 2 further comprising an amplifier coupling the  
3 sensor to the controller of the at least one of the down  
4 hole monitoring and control systems, wherein the  
5 amplifier comprises a non-cooled, high temperature  
6 amplifier.

1                   5.     The well control and monitoring system of  
2 claim 2 further comprising an analog-to-digital converter  
3 coupling the sensor to the controller of the at least one  
4 of the down hole monitoring and control systems, wherein  
5 the analog-to-digital converter comprises a non-cooled,  
6 high temperature analog-to-digital converter.

1           6.    The well control and monitoring system of  
2   claim 2 further comprising a multiplexer and an amplifier  
3   coupling the sensor to the controller of the at least one  
4   of the down hole monitoring and control systems, wherein  
5   the multiplexer comprises a non-cooled, high temperature  
6   multiplexer, and wherein the amplifier comprises a non-  
7   cooled, high temperature amplifier.

1           7.    The well control and monitoring system of  
2   claim 2 further comprising a multiplexer and an analog-  
3   to-digital converter coupling the sensor to the  
4   controller of the at least one of the down hole  
5   monitoring and control systems, wherein the multiplexer  
6   comprises a non-cooled, high temperature multiplexer, and  
7   wherein the analog-to-digital converter comprises a non-  
8   cooled, high temperature analog-to-digital converter.

1           8.    The well control and monitoring system of  
2   claim 2 further comprising an amplifier and an analog-to-  
3   digital converter coupling the sensor to the controller  
4   of the at least one of the down hole monitoring and  
5   control systems, wherein the amplifier comprises a non-  
6   cooled, high temperature amplifier, and wherein the

7 analog-to-digital converter comprises a non-cooled, high  
8 temperature analog-to-digital converter.

1           9. The well control and monitoring system of  
2 claim 2 further comprising a multiplexer, an amplifier,  
3 and an analog-to-digital converter coupling the sensor to  
4 the controller of the at least one of the down hole  
5 monitoring and control systems, wherein the multiplexer  
6 comprises a non-cooled, high temperature multiplexer,  
7 wherein the amplifier comprises a non-cooled, high  
8 temperature amplifier, and wherein the analog-to-digital  
9 converter comprises a non-cooled, high temperature  
10 analog-to-digital converter.

1           10. The well control and monitoring system of  
2 claim 1 wherein at least one of the down hole monitoring  
3 and control systems comprises a transducer arranged to  
4 perform a conversion between an electrical signal and an  
5 acoustic signal, and wherein the acoustic signal conveys  
6 information through at least one well.

1           11. The well control and monitoring system of  
2 claim 1 wherein at least one of the down hole monitoring  
3 and control systems comprises at least one  
4 electromechanical device controlled by the controller of

5 the at least one of the down hole monitoring and control  
6 systems.

1           12. The well control and monitoring system of  
2 claim 1 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature multiplexer.

1           13. The well control and monitoring system of  
2 claim 1 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature amplifier.

1           14. The well control and monitoring system of  
2 claim 1 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature analog-to-digital converter.

1           15. The well control and monitoring system of  
2 claim 1 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature multiplexer and a non-cooled, high  
5 temperature amplifier.

1           16. The well control and monitoring system of  
2 claim 1 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature multiplexer and a non-cooled, high  
5 temperature analog-to-digital converter.

1           17. The well control and monitoring system of  
2 claim 1 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature amplifier and a non-cooled, high temperature  
5 analog-to-digital converter.

1           18. The well control and monitoring system of  
2 claim 1 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature multiplexer, a non-cooled, high temperature  
5 amplifier, and a non-cooled, high temperature analog-to-  
6 digital converter.

1           19. The well control and monitoring system of  
2 claim 1 wherein the non-cooled, high temperature  
3 controller comprises a non-cooled, high temperature  
4 transceiver.

1           20. The well control and monitoring system of  
2 claim 19 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature multiplexer.

1           21. The well control and monitoring system of  
2 claim 19 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature amplifier.

1           22. The well control and monitoring system of  
2 claim 19 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature analog-to-digital converter.

1           23. The well control and monitoring system of  
2 claim 19 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature multiplexer and a non-cooled, high  
5 temperature amplifier.

1           24. The well control and monitoring system of  
2 claim 19 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature multiplexer and a non-cooled, high  
5 temperature analog-to-digital converter.

1           25. The well control and monitoring system of  
2 claim 19 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature amplifier and a non-cooled, high temperature  
5 analog-to-digital converter.

1           26. The well control and monitoring system of  
2 claim 19 wherein at least one of the down hole monitoring  
3 and control systems comprises a non-cooled, high  
4 temperature multiplexer, a non-cooled, high temperature  
5 amplifier, and a non-cooled, high temperature analog-to-  
6 digital converter.

1   xx       27. A well control and monitoring system for  
2 the control and monitoring of a well comprising:  
3           a first control and monitoring system located  
4 above the well, wherein the first control and monitoring  
5 system comprises a controller and a transceiver; and,



6           a second monitoring and control system provided  
7   within the well, wherein the second monitoring and  
8   control system comprises a non-cooled, high temperature  
9   controller and a non-cooled, high temperature  
10   transceiver, and wherein the first and second control and  
11   monitoring systems communicate with one another through  
12   their respective transceivers.

1           28. The well control and monitoring system of  
2   claim 27 wherein the second monitoring and control  
3   systems comprises at least one sensor coupled to the  
4   controller of the second monitoring and control system.

1           29. The well control and monitoring system of  
2   claim 28 further comprising a multiplexer coupling the  
3   sensor to the controller of the second monitoring and  
4   control system, wherein the multiplexer comprises a non-  
5   cooled, high temperature multiplexer.

1           30. The well control and monitoring system of  
2   claim 28 further comprising an amplifier coupling the  
3   sensor to the controller of the second monitoring and  
4   control system, wherein the amplifier comprises a non-  
5   cooled, high temperature amplifier.

1           31. The well control and monitoring system of  
2 claim 28 further comprising an analog-to-digital  
3 converter coupling the sensor to the controller of the  
4 second monitoring and control system, wherein the analog-  
5 to-digital converter comprises a non-cooled, high  
6 temperature analog-to-digital converter.

1           32. The well control and monitoring system of  
2 claim 28 further comprising a multiplexer and an  
3 amplifier coupling the sensor to the controller of the  
4 second monitoring and control system, wherein the  
5 multiplexer comprises a non-cooled, high temperature  
6 multiplexer, and wherein the amplifier comprises a non-  
7 cooled, high temperature amplifier.

1           33. The well control and monitoring system of  
2 claim 28 further comprising a multiplexer and an analog-  
3 to-digital converter coupling the sensor to the  
4 controller of the second monitoring and control system,  
5 wherein the multiplexer comprises a non-cooled, high  
6 temperature multiplexer, and wherein the analog-to-  
7 digital converter comprises a non-cooled, high  
8 temperature analog-to-digital converter.

1           34. The well control and monitoring system of  
2 claim 28 further comprising an amplifier and an analog-  
3 to-digital converter coupling the sensor to the  
4 controller of the second monitoring and control system,  
5 wherein the amplifier comprises a non-cooled, high  
6 temperature amplifier, and wherein the analog-to-digital  
7 converter comprises a non-cooled, high temperature  
8 analog-to-digital converter.

1           35. The well control and monitoring system of  
2 claim 28 further comprising a multiplexer, an amplifier,  
3 and an analog-to-digital converter coupling the sensor to  
4 the controller of the second monitoring and control  
5 system, wherein the multiplexer comprises a non-cooled,  
6 high temperature multiplexer, wherein the amplifier  
7 comprises a non-cooled, high temperature amplifier, and  
8 wherein the analog-to-digital converter comprises a non-  
9 cooled, high temperature analog-to-digital converter.

1           36. The well control and monitoring system of  
2 claim 27 wherein the second monitoring and control system  
3 comprises a transducer arranged to perform a conversion  
4 between an electrical signal and an acoustic signal, and  
5 wherein the acoustic signal conveys information through  
6 the well.

1           37. The well control and monitoring system of  
2 claim 27 wherein the second monitoring and control system  
3 comprises at least one electromechanical device  
4 controlled by the controller of the second monitoring and  
5 control system.

1           38. The well control and monitoring system of  
2 claim 27 wherein the second monitoring and control system  
3 comprises a non-cooled, high temperature multiplexer.

1           39. The well control and monitoring system of  
2 claim 27 wherein the second monitoring and control system  
3 comprises a non-cooled, high temperature amplifier.

1           40. The well control and monitoring system of  
2 claim 27 wherein the second monitoring and control system  
3 comprises a non-cooled, high temperature analog-to-  
4 digital converter.

1           41. The well control and monitoring system of  
2 claim 27 wherein the second monitoring and control system  
3 comprises a non-cooled, high temperature multiplexer and  
4 a non-cooled, high temperature amplifier.

1           42. The well control and monitoring system of  
2 claim 27 wherein the second monitoring and control system  
3 comprises a non-cooled, high temperature multiplexer and  
4 a non-cooled, high temperature analog-to-digital  
5 converter.

1           43. The well control and monitoring system of  
2 claim 27 wherein the second monitoring and control system  
3 comprises a non-cooled, high temperature amplifier and a  
4 non-cooled, high temperature analog-to-digital converter.

1           44. The well control and monitoring system of  
2 claim 27 wherein the second monitoring and control system  
3 comprises a non-cooled, high temperature multiplexer, a  
4 non-cooled, high temperature amplifier, and a non-cooled,  
5 high temperature analog-to-digital converter.

1           45. The well control and monitoring system of  
2 claim 27 wherein the first monitoring and control system  
3 is located at a surface of the well.

1   xx           46. A down hole monitoring and control system  
2   provided within a well, wherein the down hole monitoring  
3   and control system comprises:  
4               a non-cooled, high temperature controller; and,  
5               a non-cooled, high temperature transceiver  
6   coupled to the non-cooled, high temperature controller,  
7   wherein the non-cooled, high temperature transceiver  
8   transmits signals into the well and receives signals from  
9   the well.

1               47. The down hole control and monitoring  
2   system of claim 46 further comprising a transducer  
3   arranged to perform a conversion between an electrical  
4   signal and an acoustic signal, and wherein the acoustic  
5   signal conveys information through the well.

1               48. The down hole control and monitoring  
2   system of claim 47 further comprising an anechoic  
3   material coating at least a portion of the transducer.

1               49. The down hole control and monitoring  
2   system of claim 46 wherein the non-cooled, high  
3   temperature controller comprises a non-cooled, high  
4   temperature controller that can be remotely turned on and  
5   off.

1           50. The down hole control and monitoring  
2 system of claim 46 wherein the non-cooled, high  
3 temperature controller comprises a self-powered non-  
4 cooled, high temperature controller.

1           51. The down hole control and monitoring  
2 system of claim 46 wherein the non-cooled, high  
3 temperature controller comprises a non-cooled, high  
4 temperature controller that is powered remotely by  
5 electrical wire.

1           52. The down hole control and monitoring  
2 system of claim 46 wherein the non-cooled, high  
3 temperature controller comprises a non-cooled, high  
4 temperature controller that is powered remotely by  
5 optical cable.

1           53. The down hole control and monitoring  
2 system of claim 46 further comprising at least one  
3 electromechanical device controlled by the controller.

1           54. The down hole control and monitoring  
2 system of claim 46 further comprising a non-cooled, high  
3 temperature multiplexer.

1           55. The down hole control and monitoring  
2 system of claim 46 further comprising a non-cooled, high  
3 temperature amplifier.

1           56. The down hole control and monitoring  
2 system of claim 46 further comprising a non-cooled, high  
3 temperature analog-to-digital converter.

1           57. The down hole control and monitoring  
2 system of claim 46 further comprising a non-cooled, high  
3 temperature multiplexer and a non-cooled, high  
4 temperature amplifier.

1           58. The down hole control and monitoring  
2 system of claim 46 further comprising a non-cooled, high  
3 temperature multiplexer and a non-cooled, high  
4 temperature analog-to-digital converter.

1           59. The down hole control and monitoring  
2 system of claim 46 further comprising a non-cooled, high  
3 temperature amplifier and a non-cooled, high temperature  
4 analog-to-digital converter.



1                   60. The down hole control and monitoring  
2 system of claim 46 wherein the signals comprises pulses.

1                   61. The down hole control and monitoring  
2 system of claim 46 further comprising a non-cooled, high  
3 temperature multiplexer, a non-cooled, high temperature  
4 amplifier, and a non-cooled, high temperature analog-to-  
5 digital converter.